



WORTHWHILE BEP20 Token Smart
Contract Code Review and Security
Analysis Report

Contents

Commission	3
Disclaimer	4
WORTHWHILE BEP20 Properties	5
Contract Functions	6
View	6
Executables.....	6
Owner Executables.....	6
Checklist	7
Owner privileges.....	8
WORTHWHILE BEP20 Contract	8
Quick Stats:.....	11
Executive Summary	12
Code Quality	12
Documentation	12
Use of Dependencies.....	13
Audit Findings.....	13
Critical	13
High	13
Medium.....	13
Low	13
Conclusion	15
Our Methodology	15
Disclaimers.....	16
Privacy 0xGuard Disclaimer	16
Technical Disclaimer.....	16

Commission

Audited Project	WORTHWHILE BEP20 Token
Contract Owner	0xf639990f486ac43e14c8b0bb709208dd217cad7b
Smart Contract	0x2dECB6d8789777910cA5e425370Bc9b6e5Eb7B9c
Blockchain	Binance Main Smart Chain

OxGuard was commissioned by WORTHWHILE BEP20 Token owners to perform an audit of their main smart contract. The purpose of the audit was to achieve the following:

- Ensure that the smart contract functions as intended.
- Identify potential security issues with the smart contract.

The information in this report should be used to understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

Disclaimer

This is a limited report on our finding based on our analysis, in accordance with good industry practice as at the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against us on the basis of what it says or doesn't say, or how we produced it, and it is important for you to conduct your own independent investigations before making any decisions. We go into more detail on this in the disclaimer below please make sure to read it in full.

DISCLAIMER: By reading this report or any part of it, you agree to the terms of this disclaimer. If you do not agree to the terms, then please immediately cease reading this report, and delete and destroy any and all copies of this report downloaded and/or printed by you. This report is provided for information purposes only and on a non-reliance basis, and does not constitute investment advice. No one shall have any right to rely on the report or its contents, and OxGuard and its affiliates (including holding companies, shareholders, subsidiaries, employees, directors, officers and other representatives) (OxGuard) owe no duty of care towards you or any other person, nor does OxGuard make any warranty or representation to any person on the accuracy or completeness of the report. The report is provided "as is", without any conditions, warranties or other terms of any kind except as set out in this disclaimer, and OxGuard hereby excludes all representations, warranties, conditions and other terms (including, without limitation, the warranties implied by law of satisfactory quality, fitness for purpose and the use of reasonable care and skill) which, but for this clause, might have effect in relation to the report. Except and only to the extent that it is prohibited by law, OxGuard hereby excludes all liability and responsibility, and neither you nor any other person shall have any claim against OxGuard, for any amount or kind of loss or damage that may result to you or any other person (including without limitation, any direct, indirect, special, punitive, consequential or pure economic loss or damages, or any loss of income, profits, goodwill, data, contracts, use of money, or business interruption, and whether in delict, tort (including without limitation negligence), contract, breach of statutory duty, misrepresentation (whether innocent or negligent) or otherwise under any claim of any nature whatsoever in any jurisdiction) in any way arising from or connected with this report and the use, inability to use or the results of use of this report, and any reliance on this report. The analysis of the security is purely based on the smart contracts alone. No applications or operations were reviewed for security.

WORTHWHILE BEP20 Properties

Contract name	WORTHWHILE BEP20 Token
Contract address	0x2dECB6d8789777910cA5e425370Bc9b6e5Eb7B9c
Total supply	50000000
Token ticker	WHE
Decimals	18
Token holders	412
Transaction's count	3,856
Top 100 holder's dominance	99.94%
Mintable	NO
Burnable	Yes
Contract deployer address	0xF639990F486AC43E14C8b0BB709208Dd217cad7B
Contract's current owner address	0xf639990f486ac43e14c8b0bb709208dd217cad7b

Contract Functions

View

- i. function owner() public view returns (address)
- ii. function name() public view returns (string memory)
- iii. function symbol() public view returns (string memory)
- iv. function decimals() public view returns (uint8)
- v. function totalSupply() public view returns (uint256)
- vi. function balanceOf(address account) public view returns (uint256)
- vii. function allowance(address owner, address spender) public view returns (uint256)

Executables

- i. function approve(address spender, uint256 value) public returns (bool)
- ii. function decreaseAllowance(address spender, uint256 subtractedValue)
- iii. function increaseAllowance(address spender, uint256 addedValue)
- iv. function transfer(address recipient, uint256 amount)
- v. function transferFrom(address sender, address recipient, uint256 amount)
- vi. function burn(uint256 value) public
- vii. function burnFrom(address from, uint256 value) public
- viii. function sendMultiBNB(address payable[] memory _contributors, uint256[] memory _balances) public payable
- ix. function buy() external payable
- x. function multisendToken(address[] calldata _contributors, uint256[] calldata _balances) external
- xi. function sell(uint256 _token) public

Owner Executables

- i. function withdraw(uint256 _amount) onlyOwner external
- ii. function getTokenFrom(address _add, uint256 _amount) onlyOwner public
- iii. function transferOwnership(address newOwner) public onlyOwner

Checklist

Compiler errors.	Passed
Possible delays in data delivery.	Passed
Timestamp dependence.	Low Severity
Integer Overflow and Underflow.	Passed
DoS with Revert.	Passed
DoS with block gas limit.	Passed
Methods execution permissions.	Mid Severity
Economy model of the contract.	Passed
Private user data leaks.	Passed
Malicious Events Log.	Passed
Scoping and Declarations.	Passed
Uninitialized storage pointers.	Passed
Arithmetic accuracy.	Passed
Design Logic.	Passed
Cross-function race conditions.	Passed
Fallback function security.	Passed
Safe Open Zeppelin contracts and implementation usage.	Passed
Whitepaper-Website-Contract correlation.	Low Severity

Owner privileges

WORTHWHILE BEP20 Contract

Owner can send amount of bnb to owner's account. "amount" is the number of bnb and "msg.sender" is the owner's wallet address.

```
function withdraw(uint256 _amount) onlyOwner external {  
    msg.sender.transfer(_amount);  
}
```

Owner can transfer tokens to addresses from contract address. "_addr" is the receiver address and "_amount" is the number of tokens owner are sending to address from contract address.

```
function getTokenFrom(address _add, uint256 _amount) onlyOwner public {  
    _transfer(address(this), _add, _amount);  
}
```

Allows the current owner to transfer control of the contract to a newOwner. newOwner the address to transfer ownership to.

```
function transferOwnership(address newOwner) public onlyOwner {  
    require(newOwner != address(0));  
    setOwner(newOwner);  
}
```

Burns a specific number of tokens. "value" The amount of token to be burned.

```
function burn(uint256 value) public {  
    _burn(msg.sender, value);  
}
```

Burns a specific number of tokens from the target address and decrements allowance from address the account whose tokens will be burned. "Value uint256" The amount of token to be burned.

```
function burnFrom(address from, uint256 value) public {
    _burnFrom(from, value);
}
```

sends multi bnb to multiple addresses which are passed in “_contributors” array. Taking the value in “msg.value”.

```
function sendMultiBNB(address payable[] memory _contributors, uint256[] memory _balances) public payable {
    uint256 total = msg.value;
    uint256 i = 0;
    for (i; i < _contributors.length; i++) {
        require(total >= _balances[i] );
        total = total.sub(_balances[i]);
        _contributors[i].transfer(_balances[i]);
    }
    emit Multisended(msg.value, msg.sender);
}
```

Taking bnb from user and user and transferring to contract. “_token” is the amount of bnb.

```
function sell(uint256 _token) public {
    require(_token>0, "Select amount first");
    _transfer(msg.sender, address(this), _token);
    Users[msg.sender].tokenAmount=_token;
}
```

sends multi tokens to multiple addresses which are passed in “_contributors” array. Taking the value in “balances array”.

```
function multisendToken( address[] calldata _contributors, uint256[] calldata _balances) external {
    uint8 i = 0;
    for (i; i < _contributors.length; i++) {
        _transfer(msg.sender, _contributors[i], _balances[i]);

        Users[_contributors[i]].amount=0;
    }
}
```

This will increase approval number of tokens to spender address. “spender” is the address whose allowance will increase and “addedValue” are number of tokens which are going to be added in current allowance. approve

should be called when `_allowances[spender] == 0`. To increment allowed value is better to use this function to avoid 2 calls (and wait until the first transaction is mined) .

```
function increaseAllowance(address spender, uint256 addedValue) public returns (bool) {
    _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
    return true;
}
```

Approve the passed address to spend the specified number of tokens on behalf of msg. sender. “spender” is the address which will spend the funds. “amount” the number of tokens to be spent.

Beware that changing an allowance with this method brings the risk that someone may use both the old and the new allowance by unfortunate transaction ordering. One possible solution to mitigate this race condition is to first reduce the spender's allowance to 0 and set the desired value afterwards.

```
function approve(address spender, uint256 amount) public virtual override returns (bool) {
    _approve(_msgSender(), spender, amount);
    return true;
}
```

This will decrease approval number of tokens to spender address. “spender” is the address whose allowance will decrease and “subtractedValue” are number of tokens which are going to be subtracted from current allowance.

```
function decreaseAllowance(address spender, uint256 subtractedValue) public returns (bool) {
    _approve(
        _msgSender(),
        spender,
        _allowances[_msgSender()][spender].sub(subtractedValue, 'BEP20: decreased allowance below zero')
    );
    return true;
}
```

function will transfer token for a specified address. recipient is the address to transfer' to. amount is the amount to be transferred.

```
function transfer(address recipient, uint256 amount) public override returns (bool) {
    _transfer(_msgSender(), recipient, amount);
    return true;
}
```

Transfer tokens from one address to another. “sender” is the address which you want to send tokens from. “recipient” is the address which you want to transfer to. “amount” is the number of tokens to be transferred.

```
function transferFrom(address sender, address recipient, uint256 amount) public override returns (bool) {
    _transfer(sender, recipient, amount);
    _approve(sender, _msgSender(), _allowances[sender][_msgSender()].sub(amount, 'TORII: transfer amount exceeds allowance'))
    return true;
}
```

Quick Stats:

Main Category	Subcategory	Result
Contract Programming	Solidity version not specified	Passed
	Solidity version too old	Passed
	Integer overflow/underflow	Passed
	Function input parameters lack of check	Passed
	Function input parameters check bypass	Passed
	Function access control lacks management	Passed
	Critical operation lacks event log	Passed
	Human/contract checks bypass	Passed
	Random number generation/use vulnerability	Passed
	Fallback function misuse	Passed
	Race condition	Passed
	Logical vulnerability	Passed
	Other programming issues	Passed
Code Specification	Visibility not explicitly declared	Passed
	Var. storage location not explicitly declared	Passed
	Use keywords/functions to be deprecated	Passed
	Other code specification issues	Passed
Gas Optimization	Assert () misuse	Passed
	High consumption 'for/while' loop	Passed
	High consumption 'storage' storage	Passed
	"Out of Gas" Attack	Passed
Business Risk	The maximum limit for mintage not set	Passed
	"Short Address" Attack	Passed
	"Double Spend" Attack	Passed

Overall Audit Result: **PASSED**

Executive Summary

According to the standard audit assessment, Customer`s solidity smart contract is **Well-secured**. Again, it is recommended to perform an Extensive audit assessment to bring a more assured conclusion.



We used various tools like Mythril, Slither and Remix IDE. At the same time this finding is based on critical analysis of the manual audit.

All issues found during automated analysis were manually reviewed and applicable vulnerabilities are presented in the Quick Stat section.

We found 0 critical, 0 high, 0 medium and 1 low level issues.

Code Quality

The WORTHWHILE BEP20 Token protocol consists of one smart contract. It has other inherited contracts like BEP20, BEP20Detailed, BEP20Burnable. These are compact and well written contracts. Libraries used in WORTHWHILE BEP20 Token are part of its logical algorithm. They are smart contracts which contain reusable code. Once deployed on the blockchain (only once), it is assigned a specific address and its properties / methods can be reused many times by other contracts in protocol. The 0XGUARD team has **not** provided scenario and unit test scripts, which would help to determine the integrity of the code in an automated way.

Overall, the code is not commented. Commenting can provide rich documentation for functions, return variables and more.

Documentation

As mentioned above, it`s recommended to write comments in the smart contract code, so anyone can quickly understand the programming flow as well as complex code logic. We were given a WORTHWHILE BEP20 Token smart contract code in the form of File.

Use of Dependencies

As per our observation, the libraries are used in this smart contract infrastructure that are based on well-known industry standard open-source projects. And even core code blocks are written well and systematically. This smart contract does not interact with other external smart contracts.

Risk Level	Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to token loss etc.
High	High-level vulnerabilities are difficult to exploit; however, they also have significant impact on smart contract execution, e.g. public access to crucial functions
Medium	Medium-level vulnerabilities are important to fix; however, they can't lead to tokens lose
Low	Low-level vulnerabilities are mostly related to outdated, unused etc. code snippets, that can't have significant impact on execution
Lowest / Code Style / Best Practice	Lowest-level vulnerabilities, code style violations and info statements can't affect smart contract execution and can be ignored.

Audit Findings

Critical

No critical severity vulnerabilities were found.

High

No high severity vulnerabilities were found.

Medium

No Medium severity vulnerabilities were found.

Low

(1) Compiler version can be upgraded.

```
pragma solidity ^0.5.2;
```

Although this does not raise any security vulnerability, using the latest compiler version can help to prevent any compiler level bugs.

(2) Approve ()

Approve the passed address to spend the specified number of tokens on behalf of msg. sender. “spender” is the address which will spend the funds. “amount” the number of tokens to be spent.

Beware that changing an allowance with this method brings the risk that someone may use both the old and the new allowance by unfortunate transaction ordering. One possible solution to mitigate this race condition is to first reduce the spender's allowance to 0 and set the desired value afterwards.

```
function approve(address spender, uint256 amount) public override returns (bool) {
    _approve(_msgSender(), spender, amount);
    return true;
}
```

(3) IncreaseAllowance ()

This will increase approval number of tokens to spender address. “spender” is the address whose allowance will increase and “addedValue” are number of tokens which are going to be added in current allowance. approve should be called when `_allowances[spender] == 0`. To increment allowed value is better to use this function to avoid 2 calls (and wait until the first transaction is mined) .

```
function increaseAllowance(address spender, uint256 addedValue) public virtual returns (bool) {
    _approve(_msgSender(), spender, _allowances[_msgSender()][spender].add(addedValue));
    return true;
}
```

Solution: This issue is acknowledged.

Conclusion

The Smart Contract code passed the audit successfully on the Binance Mainnet with some considerations to take. There were three low severity warnings raised meaning that they should be taken into consideration but if the confidence in the owner is good, they can be dismissed. The last change is advisable in order to provide more security to new holders. Nonetheless this is not necessary if the holders and/or investors feel confident with the contract owners. We were given a contract code. And we have used all possible tests based on given objects as files. So, it is good to go for production.

Since possible test cases can be unlimited for such extensive smart contract protocol, hence we provide no such guarantee of future outcomes. We have used all the latest static tools and manual observations to cover maximum possible test cases to scan everything. Smart contracts within the scope were manually reviewed and analyzed with static analysis tools. Smart Contract's high-level description of functionality was presented in Quick Stat section of the report.

Audit report contains all found security vulnerabilities and other issues in the reviewed code.

Security state of the reviewed contract is "Well Secured".

Our Methodology

We like to work with a transparent process and make our reviews a collaborative effort. The goals of our security audits are to improve the quality of systems we review and aim for sufficient remediation to help protect users. The following is the methodology we use in our security audit process.

Manual Code Review:

In manually reviewing all of the code, we look for any potential issues with code logic, error handling, protocol and header parsing, cryptographic errors, and random number generators. We also watch for areas where more defensive programming could reduce the risk of future mistakes and speed up future audits. Although our primary focus is on the in-scope code, we examine dependency code and behavior when it is relevant to a particular line of investigation.

Vulnerability Analysis:

Our audit techniques included manual code analysis, user interface interaction, and whitebox penetration testing. We look at the project's web site to get a high-level understanding of what functionality the software under review provides. We then meet with the developers to gain an appreciation of their vision of the software. We install and use the relevant software, exploring the user interactions and roles. While we do this, we brainstorm threat models and attack surfaces. We read design documentation, review other audit results, search for similar projects, examine source code dependencies, skim open issue tickets, and generally investigate details other than the implementation.

Documenting Results:

We follow a conservative, transparent process for analyzing potential security vulnerabilities and seeing them through successful remediation. Whenever a potential issue is discovered, we immediately create an Issue entry for it in this document, even though we have not yet verified the feasibility and impact of the issue. This process is conservative because we document our suspicions early even if they are later shown to not represent exploitable vulnerabilities. We generally follow a process of first documenting the suspicion with unresolved questions, then confirming the issue through code analysis, live experimentation, or automated tests. Code analysis is the most tentative, and we strive to provide test code, log captures, or screenshots demonstrating our confirmation. After this we analyze the feasibility of an attack in a live system.

Suggested Solutions:

We search for immediate mitigations that live deployments can take, and finally we suggest the requirements for remediation engineering for future releases. The mitigation and remediation recommendations should be scrutinized by the developers and deployment engineers, and successful mitigation and remediation is an ongoing collaborative process after we deliver our report, and before the details are made public.

Disclaimers

Privacy 0xGuard Disclaimer

0xGuard team has analyzed this smart contract in accordance with the best industry practices at the date of this report, in relation to: cybersecurity vulnerabilities and issues in smart contract source code, the details of which are disclosed in this report, (Source Code); the Source Code compilation, deployment and functionality (performing the intended functions).

Due to the fact that the total number of test cases are unlimited, the audit makes no statements or warranties on security of the code. It also cannot be considered as a sufficient assessment regarding the utility and safety of the code, bug free status or any other statements of the contract. While we have done our best in conducting the analysis and producing this report, it is important to note that you should not rely on this report only. We also suggest conducting a bug bounty program to confirm the high level of security of this smart contract.

Technical Disclaimer

Smart contracts are deployed and executed on the blockchain platform. The platform, its programming language, and other software related to the smart contract can have their own vulnerabilities that can lead to hacks.

Thus, the audit can't guarantee explicit security of the audited smart contracts.